

15. (ADDED) The mechanism for supporting a substrate to be coated with the film of claim 1, wherein the moving means is configured and arranged so as to cause the support members to move in a direction generally perpendicular to the substrate end surface.

16. (ADDED) The mechanism for supporting a substrate to be coated with the film of claim 1, wherein the moving means is configured and arranged so as to cause each of the support members to rotate about a long axis of each support member.

REMARKS

Applicant appreciates the Examiner's thorough examination of the subject application and requests reconsideration of the subject application based on the following remarks.

Claims 1-12 are pending in the subject application. Claims 9-12 were withdrawn from consideration. Claims 1-8 stand rejected under 35 U.S.C. 103.

Claim 1 was amended for clarity. Claim 2 was rewritten in independent form and the limitations from the included base claim (claim 1) were revised for clarity as indicated above. Claims 13-15 were added to more distinctly claim embodiments of Applicant's invention.

Included herewith is a marked-up version of the amendments to the subject application by the current amendment. The marked-up versions are found on the pages captioned or entitled "Details of Amendments" that follow the signature page of the within Response.

35 U.S.C. §103 REJECTIONS

Claims 1-8 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Obara [JP 8-107076] in view of Nakane [JP 58-040837] and Mears et al. [USP 5,040,484; "Mears"]. Because claims 1-2 were amended in the foregoing amendment, the following discussion refers to the language of the amended claims. However, only those amended features specifically relied upon to distinguish the claimed invention from the cited prior art shall be considered as being made to overcome the cited reference. In this regard, claim 1 was amended for clarity, and was not made to distinguish the present invention from the cited combination of references. As such, Applicant does not consider this amendment to claim 1 as narrowing the scope of the claim as that term is used in the CAFC's *Festo* decision.

The above-referenced Office Action provides that Obara discloses a substrate support for use in a coating apparatus including a stage and a shaft member for angularly displacing the stage bearing the substrate from a substrate receiving position to a vertical position, and a plurality of support members protruding from the substrate bearing surface for supporting the edge of the substrate when the stage is in the vertical position. It also is admitted that Obara does not teach a means for moving the support members.

However, further reference is made to Nakane and Mears as disclosing an apparatus for clamping a semiconductor wafer securely to a wafer support, where the clamping means comprises protruding support members that clamp the wafer securely there between. It is thus concluded in the Office Action that it would have been obvious

to one skilled in the art to provide the substrate support surface of Obara with the clamping support members as illustrated in Nakane and Mears. Applicant respectfully traverses as discussed below.

Applicant claims, claim 1, a mechanism for supporting a substrate to be coated with a film, which mechanism is used in a film forming apparatus. The mechanism includes a stage, a shaft member, a plurality of support members and a moving means for moving the support members. The stage receives the substrate that has been transported into the film forming apparatus to form a film on the substrate. The shaft member angularly displaces that stage that is bearing the substrate, from the substrate receiving position at which the stage received the substrate, to a film forming position at which a substrate bearing surface of the stage is vertical or substantially vertical. The plurality of support members are provided so as to protrude from the substrate bearing surface of the stage to support an end surface of the substrate. This substrate end surface faces downwards when the stage is angularly displaced to the film forming position.

In contrast to the present invention, Obara discloses a batch-type low-pressure CVD apparatus that is different in design, function, and end product result than the invention that is disclosed and taught in the subject application. Obara teaches an apparatus for forming a thin film for coating a wafer that includes a stage, a shaft member, and *non-moveable* support members that contact the wafer when the thin film is being formed. This particular reference and the limitations thereof are described in the subject application (see pages 1-2 thereof). As described in the subject application, when the wafer is in contact with the support members, the thin film material can

adhere to the support members as well as the wafer. Thus, when the wafer is removed from the stage by lifting it up from the top of the susceptor, the thin film adhering to these non-movable support members pulls the thin film on the wafer. As further provided in the subject application, the end result of the Obara method and device is that in addition to the peeling off of the thin film, cracks, chips, or the like also may be caused in the wafer itself when it is being lifted up. In sum, the device and method disclosed in Obara can result in damage to the applied thin film and/or damage to the wafer itself.

As indicated in the subject application (e.g., p. 3 thereof), because the support members of the present invention are movable, peeling-off of the thin film which has been formed on the substrate surface, as well as the cracks in the chips in the substrate coated with the thin film, can be almost completely prevented by moving the support members before transporting the substrate out of the film forming apparatus after formation of the film. Applicant notes that the problem described in the subject application is nowhere described or suggested in Obara and that solution to this problem also is nowhere described or suggested in Obara.

In regards to the secondary references, Nakane and Mears, each of these references also nowhere describes the problem described in the subject application as well as nowhere describing the solution to this problem. This is not surprising, because as discussed hereinafter each of these references describe a method and apparatus for clamping a semiconductor wafer, which method and apparatus nowhere describes, teaches, or suggests the supporting mechanism as set forth in claim 1.

Nakane describes a clamping device where a wafer clamping claw (8) is located in a longitudinal slot provided at each of the four corners of a mounting plate, which claw projects there above. As described therein, the wafer clamping claws are moved inwardly and are respectively slanted to the inside so as to securely hold the wafer. As further illustrated in the middle figure, the wafer clamping claws are moved outwardly and are respectively slanted outwardly to release the wafer.

Mears describes a mechanism for retaining a multiplicity of wafers disposed in a rotating disc (2). As described therein, a wafer is conveyed to a selected platen on the disc and this means for transferring is located in a transfer chamber. It also is described, with reference to figures 5-8 thereof, that a plurality/ multiplicity of fingers extend slightly above the flat surface of each platen, which fingers retain the wafer. As further described, an actuation mechanism causes these fingers to be moved inward radially so as to clamp the wafer there between. Correspondingly, the actuation mechanism causes the fingers to be moved outward radially so as to release the wafer so it can be removed from the platen. Such removal is effected by raising the wafer above the surface of the platen allowing the wafer to be transferred elsewhere in the transfer chamber.

In sum, Nakane and Mears both describe a method and apparatus in which opposing fingers or members are moved towards each other to clamp and moved away from each other to release the wafer. Consequently, the structural arrangement of these fingers or members is completely different from that of Obara as well as the supporting mechanism as set forth in claim 1 of the subject application. As set forth in claim 1, the support members support an end surface of the substrate, the end surface

which faces downwards when the stages are angularly displaced to the film forming position.

In addition to not describing the problem or the solution of the present invention, the clamps of Nakane would not be useful when combined with Obara because they would not prevent peeling, chipping, or cracking of the wafer. These clamps angle towards the wafer and make significant contact with the wafer surface as well as increasing the surface area of the clamps available for the thin film to be coated on. Thus, when the clamp is removed, peeling, chipping, or cracking can occur on the surface where the clamp contacted the wafer.

The support members of Mears have the same problem as Obara and Nakane, in that peeling, chipping, and cracking is not prevented. The Examiner cites Mears as disclosing that protruding clamping support members can securely hold a wafer as it is rotated by a shaft from a horizontal position to a vertical position. The support members of Mears are actually "machined to conform to the shape of the edge of the workpiece ... they form portions of a circle to match the circumference of the circular wafer." (US 5,040,484 column 5, lines 2-7). Thus, the support members are designed to have a significant amount of contact with the wafer.

In addition, it should be recognized that in Mears there are plurality or more of wafers that are being secured to the disc as the disc is being rotated from a horizontal to a vertical position. Also, once this disc is rotated into the vertical position it is further rotated about a central axis for processing of the wafers. As such, and in contrast to the apparatus disclosed in Obara, it is not physically possible for the wafer in Mears to be only supported from an end surface of the wafer, otherwise wafers

would fall off as the disc is rotated from the horizontal to the vertical position as well as when the disc is being rotated about the central axis during processing.

Moreover, if Obara was modified based on the teachings of either the two secondary references, Nakane and Mears, this still would not yield the apparatus and methodology as claimed by Applicant. As the Examiner has admitted, the two secondary references describe a clamping mechanism, which mechanism must be configured and arranged so the fingers or members comprising the mechanism are disposed in way that the fingers or members can be moved towards each other so as to clamp the article there between. It should be recognized, that such a modification would destroy or irretrievably alter the manner in which Obara is intended to operate or function.

Applicant respectfully submits that absent the teachings of the subject application, there is no motivation to combine the teachings of the secondary references in a limited and design altering fashion with the apparatus as described in Obara so as to yield the invention claimed by Applicant.

For purposes of the advancing prosecution, Applicant rewrote claim 2 so as to be in independent form in the foregoing amendment. As to claim 2, this claims adds the further limitation that the moving means causes the support members to move in parallel in one direction of three dimensions on the stage or causes the support members to rotationally move on the stage. As noted above, the fingers or members of either of the two secondary references are moved inwardly or outwardly. Thus, neither of these references can disclose, teach, or suggested rotationally moving the support members of the stage. Such motion is physically impossible for the devices disclosed in

the secondary references. The secondary references also cannot disclose the manner in which the support members are moved in the one direction.

As the Federal circuit has stated, "[t]he mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification." *In re Fritch*, 972 F.2d 1260, 1266, 23 USPQ2d 1780, 1783-84 (Fed. Cir. 1992). Obviousness may not be established using hindsight or in view of the teachings or suggestions of the inventor. *Para-Ordance Mfg. v. SGS Importers Int'l, Inc.*, 73 F.2d 1085, 1087, 37 USPQ2d 1237, 1239 (Fed. Cir. 1995). As indicated above, none of the references suggest the desirability of the modification to the apparatus disclosed in Obara so as to yield the supporting mechanism and methodology claimed on Applicant.

As provided in MPEP 2143.01, obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. *In re Fine*, 837 F. 2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F. 2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). As provided above, the references cited, alone or in combination, include no such teaching, suggestion or motivation.

Also, and as provided in MPEP 2143.02, a prior art reference can be combined or modified to reject claims as obvious as long as there is a reasonable expectation of success. *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Additionally, it also has been held that if the proposed modification or combination would change the principle of operation of the prior art invention being modified, then

the teachings of the references are not sufficient to render the claims *prima facie* obvious. Further, and as provided in MPEP-2143, the teaching or suggestion to make the claimed combination and the reasonable suggestion of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). As can be seen from the forgoing discussion regarding the disclosures of the cited references, there is no reasonable expectation of success provided in any reference that if the support members in Obara were made moveable they would be reasonably successful in overcoming the problem described by Applicant. Also, it is clear from the foregoing discussion that the modification suggested by the Examiner to Obara, namely adding a clamping mechanism as disclosed in any of the secondary references, would change the principle of operation of the device disclosed in Obara as well as not overcoming the problem described by Applicant.

As provided by the Federal circuit, a 35 U.S.C. §103 rejection based upon a modification of a reference that destroys the intent, purpose or function of the invention disclosed in a reference, is not proper and the *prima facie* case of obviousness cannot be properly made. In short there would be no technological motivation for engaging in the modification or change. To the contrary, there would be a disincentive. *In re Gordon*, 733 F. 2d 900, 221 USPQ 1125 (Fed. Cir. 1984). In the present case it is clear that if Obara was modified in the manner suggested by the Examiner so as to include the clamping mechanisms described in either of Nakane or Mears, it would destroy the intent, purpose or function of the device as taught by Obara, which includes no clamping function or mechanism.

Applicant: M. Kawaguchi
U.S.S.N.: 09/470,615
RESPONSE TO OFFICE ACTION
Page 13

It is respectfully submitted that for the foregoing reasons, claims 1-8 are patentable over the cited references and satisfy the requirements of 35 U.S.C. 103. As such, claims 1-8 are allowable.

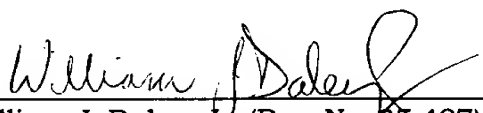
It is respectfully submitted that the subject application is in a condition for allowance. Early and favorable action is requested.

Although claims were added to the subject application, Applicant believes that additional fees are not required. However, if for any reason a fee is required, a fee paid is inadequate or credit is owed for any excess fee paid, you are hereby authorized and requested to charge Deposit Account No. **04-1105**.

Respectfully submitted,

Date: April 11, 2002

Customer No.: 21874



William J. Daley, Jr. (Reg. No: 65,487)
EDWARDS & ANGELL, LLP
PO BOX 9169
Boston, MA 02209
Tel. No. (617) 439-4444

DETAILS OF AMENDMENTS

Please amend the subject application as follows:

IN THE CLAIMS

Amend claims 1 and 2 to read as follows:

1. (AMENDED) A mechanism for supporting a substrate to be coated with ^{(the} ~~the~~ ⁾ film, which mechanism is used in a film forming apparatus, comprising:
 - a stage for receiving a substrate which has been transported into the film forming apparatus to form a film on the substrate;
 - a shaft member for angularly displacing the stage, ~~that is~~ bearing the substrate, from a substrate receiving position at which the stage received the substrate, to a film forming position at which a substrate bearing surface of the stage is vertical or substantially vertical;
 - a plurality of support members which are provided so as to protrude from the substrate bearing surface of the stage, for supporting an end surface of the substrate, which faces downwards, when the stage is angularly displaced to the film forming position; and
 - moving means for moving the support members.

2. (AMENDED) ~~The mechanism for supporting a substrate to be coated with a~~
~~film of claim 1;~~ A mechanism for supporting a substrate to be coated with the film,
which mechanism is used in a film forming apparatus, comprising:

_____ a stage for receiving a substrate which has been transported into the film forming apparatus to form a film on the substrate;

_____ a shaft member for angularly displacing the stage, that is bearing the substrate, from a substrate receiving position at which the stage received the substrate, to a film forming position at which a substrate bearing surface of the stage is vertical or substantially vertical;

_____ a plurality of support members which are provided so as to protrude from the substrate bearing surface of the stage, for supporting an end surface of the substrate, which faces downwards, when the stage is angularly displaced to the film forming position;

_____ moving means for moving the support members; and

wherein the moving means causes the support members to move in parallel in one direction of three dimensional directions on the stage or causes the support members to rotationally move on the stage.

Add new claim(s) 13-16 that read as follows:

13. (ADDED) The mechanism for supporting a substrate to be coated with the film of claim 1, wherein the moving means is configured and arranged so as to cause the support members to move in one direction with respect to a long axis of the support members.

14. (ADDED) The mechanism for supporting a substrate to be coated with the film of claim 1, wherein the moving means is configured and arranged so as to cause

Applicant: M. Kawaguchi
U.S.S.N.: 09/470,615
RESPONSE TO OFFICE ACTION
Page 16

the support members to move in a direction generally perpendicular to a long axis of the support members.

15. (ADDED) The mechanism for supporting a substrate to be coated with the film of claim 1, wherein the moving means is configured and arranged so as to cause the support members to move in a direction generally perpendicular to the substrate end surface.

16. (ADDED) The mechanism for supporting a substrate to be coated with the film of claim 1, wherein the moving means is configured and arranged so as to cause each of the support members to rotate about a long axis of each support member.